

Claims

1. A method for automatic identification of microorganisms collected on a carrier that are particles, airborne or present in water, in the form of fungal spores and bacteria, comprising the following steps:

- a) - at least one recording of the image of the carrier surface with the collected particles as a color image and digitalization this color image;
- b) - a conversion of the digitalized color image into a grayscale image or into a grayscale image and, subsequently, into a silhouette image by at least one transformation step, wherein, when particles are present, an image is produced with resulting full-surface labeled objects of a grayscale and a background of a different grayscale;
- c) - an identification of objects in the grayscale image and/or in the silhouette image by a model-based comparative method;
- d) - a marking of the contours of identified objects in the color image and/or in the grayscale image;
- e) - at least one feature determination of the identified objects in the color image and/or in the grayscale image;
- f) - a case-by-case classification of the objects based on the at least one feature determination;
- g) - an indication and/or saving of the classified objects as species and/or name and/or code of the classified and thus identified objects; and
- h) - an indication and/or saving of the non-classified objects as a color image and/or grayscale image and/or silhouette image of the thus present, at least one unidentified object, wherein this object subsequently is either discarded or added as a new case with determined class in the classification system.

2. The method according to claim 1, characterized in that after case-by-case classification the objects are counted and in that the classified objects are indicated and/or saved as species and/or name and/or code with their count of the classified

and thus identified objects.

3. The method according to claim 1, characterized in that after case-by-case classification the objects are counted and in that the non-classified objects are indicated and/or saved as color image and/or grayscale image and/or silhouette image with their count of the thus present, at least one non-identified object, wherein this object is subsequently either discarded or added as a new case with determined class into the classification system.

4. The method according to claim 1, characterized in that, after digitalization, errors are purged from the image of the carrier surface with the particles and the image is standardized by image preprocessing.

5. The method according to claim 1, characterized in that at least one of the features shape, texture or structure of the objects in the color image and/or grayscale image is determined.

6. The method according to claim 1, characterized in that by means of a first image analysis overlapping particles of the color image or of the grayscale image are separated, in that these particles as objects are removed from the color image, and saved as a partial image, in that by means of a second image analysis overlapping objects of this partial image are separated from one another, in that the separated overlapping objects are saved as partial images, in that the objects that are only partially recorded because of overlap are identified by comparison with saved and identified objects, and in that the original and individualized object, the determined identified object, and the level of congruence are indicated and/or saved.

7. The method according to claim 1, characterized in that the image of the carrier surface with the collected particles is recorded as a color image at least once two-dimensionally and/or sterically and/or three-dimensionally.

8. The method according to claim 1, characterized in that prior to recording of the image of the carrier surface with the collected particles as a color image the carrier surface with the collected particles is dyed.

5 9. The method according to claim 1, characterized in that after recording the image or one image of the carrier surface with the collected particles as a color image the carrier surface with the collected particles is dyed, in that at least one image of the dyed carrier surface with the collected particles is recorded as a color image and digitalized, and in that the steps b) to h) are performed for the at least one image of the carrier surface as well as for the at least one image of the dyed carrier
10 surface.